MAPPING OCCURRENCES OF POTENTIALLY ASBESTOS-BEARING SERPENTINITES AND TREMOLITIC ROCKS IN THE SIERRA NEVADA FOOTHILLS OF CALIFORNIA USING IMAGING SPECTROSCOPY

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Imaging spectroscopy data collected by the Airborne Visible/Infrared Imaging Spectrometer (AVIRIS) during the summer of 1997 over portions of Calavaras County in foothills of the Sierra Nevada of California have been mapped using the USGS Tetracorder spectral mapping algorithm. Resulting mineral maps of the 2 - 2.5 micron reflectance spectral region reveal numerous outcrops of chrysotile- and antigorite-bearing serpentinite and several outcrops of tremolite/talc-bearing schists along a major fault zone. Surface mineralogy of the serpentine bodies is detectable with AVIRIS in some cases because of the low density vegetation cover associated with the high Mg soils developed on these rocks. In cases where the vegetative cover is too thick to directly map surface mineralogy, it may be possible to indirectly map serpentinites and ultramafic rocks based on their close association with chaparral vegetation. Spectral detection of tremolite/talc-bearing units was limited to well exposed rocks in quarries and along shorelines. Tetracorder was able to map different grain sizes of chrysotile in rocks exposed in an asbestos quarry. With additional work it may be possible to correlate chrysotile grain size with degree of fibrous crystal habit. A small portable field spectrometer has been successfully used to detect serpentine minerals in hand specimens. The correlation between spectral detection of serpentine minerals and presence of protocol asbestos fibers will be explored as a possible technique to screen samples in the field allowing those with high potential to be selected for more in depth analysis. Such a screening tool could accelerate the process of mapping entire counties for asbestos potential at the hand specimen or remote sensing scales.